CLAIMS:

1. A process for preparing fully drawn crimped bicomponent fibers, having after-heat-set crimp contraction values above 30%, comprising the steps of:

(A) providing two compositionally different polyesters;

(B) melt-spinning the two polyesters from a spinneret to form at least one bicomponent fiber;

(C) providing at least one flow of gas to at least one quench zone below the spinneret and accelerating the gas flow to a maximum velocity in the direction of fiber travel;

(D) passing the fiber through said zone(s);

(E) withdrawing the fiber at a withdrawal speed such that the ratio of the maximum gas velocity to the withdrawal speed is so chosen to achieve a specific draw ratio range;

(F) heating and drawing the fiber at a temperature of 50-185°C at a draw ratio of about 1.4-4.5;

(G) heat-treating the fiber by heating it to a temperature sufficient to result in an after-heat-set contraction value above 30%; and

(H) winding up the fiber at a speed of at least about 3,300 meters per minute.

2. The process of claim 1 wherein the weight ratio of the polyesters is about 30/70 to 70/30, the fiber has a side-by-side or eccentric sheath core cross-section, and wherein the fiber is withdrawn at a speed of about 820-4,000 meters per minute, heated to a temperature of 100-175°C and drawn, and heat-treated by heating it to a temperature of about 140-185°C.

3. The process of claim 2 wherein the draw ratio is about 2.4-4.0, and the fiber is heat-treated by heating it to a temperature of about 160-175°C, and wound up at a speed of at least about 4,500 meters per minute.

4. The process of claim 1 wherein the two polyesters are poly(trimethylene terephthalate) and a polyester selected from the group consisting of poly(ethylene terephthalate) and a copolyester of poly(ethylene terephthalate), the weight ratio of the polyesters is about 30/70 to 70/30, the fiber has a side-by-side cross-section, and the fiber is withdrawn at a speed of about 1,000-3,000 meters per minute, heat-treated by heating it to a temperature of about 140-185°C, and wound up at a speed about 5,000-6,100 meters per minute.

5. The process of claim 1 wherein gas is supplied to the quench zone at superatmospheric pressure, the weight ratio of the polymers is about 40/60 to 60/40, and steps (F) and (G) are combined and carried out at a temperature of about 140-185°C.

6. The process of claim 1 wherein the two polyesters are poly(trimethylene terephthalate) and a polyester selected from the group consisting of poly(ethylene terephthalate) and a copolyester of poly(ethylene terephthalate), gas is supplied to two quench zones at superatmospheric pressure and the weight ratio of the polymers is 40/60 to 60/40, and the fiber is heat-treated by heating it to a temperature of

about 140-185°C and wound up at a speed of about 5,000-8,000 meters/minute.

7. The process of claim 6 wherein the selected polyester is a copoly(ethylene terephthalate) in which a comonomer used to make the copolyester is selected from the group consisting of:

linear, cyclic, and branched aliphatic dicarboxylic acids having 4-12 carbon atoms;

aromatic dicarboxylic acids having 8-12 carbon atoms;

linear, cyclic, and branched aliphatic diols having 3-8 carbon atoms; and

aliphatic and araliphatic ether glycols having 4-10 carbon atoms.

8. The process of claim 7 wherein the comonomer is selected from the group consisting of isophthalic acid, pentanedioic acid, hexanedioic acid,dodecanedioic acid, 1,4-cyclohexanedicarboxylic acid, 1,3-propane diol, and 1,4-butanediol and is present in the copolyester at a level of about 0.5-15 mole percent and the fiber is heat-treated by heating it to a temperature of about 160-175°C.

9. The process of claim 1 wherein the quench gas is accelerated in the direction of fiber travel utilizing subatmospheric pressure in a quench zone below the spinneret.

10. A process for preparing fully drawn crimped bicomponent fibers, having after-heat-set crimp contraction values above 30%, comprising the steps of:

(A) providing two compositionally different polyesters in a weight ratio of about 30/70 to 70/30;

(B) melt-spinning the two polyesters from a spinneret to form at least one bicomponent fiber having a side-by-side or eccentric sheath-core cross-section;

(C) providing a first and second flow of gas to first and second quench zones at superatmospheric pressure below the spinneret;

(D) combining the gas flows in the second quench zone;

(E) passing the fiber through the first and second quench zones;

(F) accelerating the gas flow to a maximum velocity in the direction of fiber travel;

(G) withdrawing the fiber at a withdrawal speed of about 820-4,000 meters per minute such that the ratio of the maximum velocity of the gas to the withdrawal speed is so chosen to achieve a specific draw ratio range;

(H) heating the fiber to a temperature of 50-185°C and drawing it at a draw ratio of about 1.4-4.5;

(I) heat-treating the fiber at substantially constant length by heating it to a temperature sufficient to result in an after-heat-set contraction value above about 30%; and

(J) winding up the fiber at a speed of at least about 3,300 meters per minute.

11. The process of claim 10 wherein the two polyesters are poly(trimethylene terephthalate) having an IV of 0.85-1.50 dl/g and a polyester having an IV of 0.45-0.80 dl/g selected from the group consisting of poly(ethylene terephthalate) and a copolyester of poly(ethylene terephthalate), the draw ratio is about 2.4-4.0, and the fiber is heat-treated by heating it to a temperature of about 140°C-185°C and wound up at a speed of at least about 4,500 meters per minute.

12. The process of claim 11 wherein a comonomer utilized to make the copolyester is selected from the group consisting of isophthalic acid, pentanedioic acid, hexanedioic acid, dodecanedioic acid, 1,4-cyclohexanedicarboxylic acid, 1,3-propane diol, and 1,4-butanediol and is present in the copolyester at a level of 0.5-15 mole percent, and the fiber is wound up at a speed of about 5,000-8,000 meters per minute.

13. A process for preparing fully drawn crimped bicomponent fibers, having after-heat-set crimp contraction values above about 30%, comprising the steps of:

(A) providing poly(trimethylene terephthalate) and a polyester selected from the group consisting of poly(ethylene terephthalate) and a copolyester of poly(ethylene terephthalate) having different intrinsic viscosities;

(B) melt-spinning the two polyesters from a spinneret to form at least one bicomponent fiber having a side-by-side or eccentric sheath core cross-section;

(C) providing a flow of gas to a quench zone below the spinneret;

(D) passing the fiber through the quench zone;

(E) withdrawing the fiber;

(F) heating the fiber to a temperature of 50-185°C and drawing it at a draw ratio of about 1.4-4.5;

(G) heat-treating the fiber by heating it to a temperature sufficient to result in an after-heat-set contraction value above about 30%; and

(H) winding up the fiber at a speed of at least about 3,300 meters per minute.

14. The process of claim 13 wherein the weight ratio of the selected polyester and poly(trimethylene terephthalate) is about 30/70 to 70/30, the flow of gas is cross-flow, and the fiber is withdrawn at a speed of about 700-3,500 meters per minute, heat-treated by heating it to a temperature of about 140-185°C, and wound up at a speed of at least about 4,000 meters per minute.

15. The process of claim 13 wherein the weight ratio of the selected polyester and poly(trimethylene terephthalate) is about 40/60 to 60/40, and the fiber is withdrawn at a speed of about 1,000-3,000 meters per minute, drawn at a draw ratio of about 2.4-4.0, heat-treated by heating it to a temperature of about 140-185°C, and wound up at a speed of about 4,500-5,200 meters per minute.

16. The process of claim 13 wherein the selected polyester has an intrinsic viscosity of about 0.45-0.80 dl/g, poly(trimethylene terephthalate) has an intrinsic viscosity of about 0.85-1.50 dl/g, and the fiber has a side-by-side cross-section and a cross-sectional shape selected from the group consisting of snowman, oval, and substantially round.

17. The process of claim 13 wherein the bicomponent fibers have after-heat-set crimp contraction values above 40%, and wherein the intrinsic viscosities of the two polyesters are 0.45-0.60 dl/g and 1.00-1.20 dl/g, respectively.

18. The process of claim 13 wherein a comonomer utilized to make the copolyester is selected from the group consisting of:

linear, cyclic, and branched aliphatic dicarboxylic acids having 4-12 carbon atoms;

aromatic dicarboxylic acids having 8-12 carbon atoms;

linear, cyclic, and branched aliphatic diols having 3-8 carbon atoms; and

aliphatic and araliphatic ether glycols having 4-10 carbon atoms.

19. The process of claim 18 wherein the comonomer is selected from the group consisting of isophthalic acid, pentanedioic acid, hexanedioic acid, dodecanedioic acid, 1,4-cyclohexanedicarboxylic acid, 1,3-propane diol, and 1,4-butanediol and is present in the copolyester at a level of about 0.5-15 mole percent, and the fiber is heat-treated by heating it to about 160-175°C.

20. A bicomponent fiber of about 0.6-1.7 dtex comprising poly(trimethylene terephthalate) and a polyester selected from the group consisting of poly(ethylene terephthalate) and copolyesters of poly(ethylene terephthalate), having an after-heat-set crimp contraction value above about 30%, a cross-section selected from the group consisting of side-by-side and eccentric sheath core, and a cross-sectional shape selected from the group consisting of snowman, oval, and substantially round.

21. The fiber of claim 20 wherein the weight ratio of the selected polyester to poly(trimethylene terephthalate) is about 30/70 to 70/30, and the fiber has an after-heat-set crimp contraction value of at least about 40% and a substantially round cross-sectional shape.

22. The fiber of claim 20 wherein the selected polyester is a copolyester of poly(ethylene terephthalate) in which a comonomer utilized to make the copolyester is selected from the group consisting of:

linear, cyclic, and branched aliphatic dicarboxylic acids having 4-12 carbon atoms;

aromatic dicarboxylic acids having 8-12 carbon atoms;

linear, cyclic, and branched aliphatic diols having 3-8 carbon atoms; and

aliphatic and araliphatic ether glycols having 4-10 carbon atoms.

23. The fiber of claim 22 wherein the comonomer is selected from the group consisting of isophthalic acid, pentanedioic acid, hexanedioic acid, dodecanedioic acid, 1,4-cyclohexanedicarboxylic acid, 1,3-propane diol, and 1,4-butanediol and is present in the copolyester at a level of about 0.5-15 mole percent.

24. A bicomponent fiber having an after-heat-set crimp contraction value above about 30% and an average decitex spread of less than about 2.5%, the fiber comprising poly(trimethylene terephthalate) and a polyester selected from the group consisting of poly(ethylene terephthalate) and copolyesters of poly(ethylene terephthalate), having a cross-section selected from the group consisting of side-by-side and eccentric sheath core and a cross-sectional shape selected from the group consisting of snowman, oval, and substantially round.

25. The fiber of claim 24 having a crimp contraction value of above 40%, an average decitex spread in the range of about 1.0-2.0%, a side-by-side

cross-section, a substantially round cross-sectional shape.

26. The fiber of claim 25 having a weight ratio of the selected copolyester to poly(trimethylene terephthalate) of about 30/70 to 70/30, and a comonomer utilized to make the copolyester is selected from the group consisting of isophthalic acid, pentanedioic acid, hexanedioic acid, dodecanedioic acid, 1,4-cyclohexanedicarboxylic acid, 1,3-propane diol, and 1,4-butanediol, the comonomer being present in the copolyester at a level of about 0.5-15 mole percent.